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MINERAL CHEMISTRY EVIDENCE OF MAGMATIC EVOLUTION IN THE BARRA DO ITAPIRAPUÃ CARBONATITE, SOUTHERN BRAZIL

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The Barra do Itapirapuã carbonatite belongs to a Cretaceous province in southern Brazil, related to the opening of the South Atlantic, and is emplaced in a Proterozoic granite. The carbonatite complex is mainly composed of plutonic magnesio- and ferrocarbonatite, and smaller amounts of subvolcanic ferro-, magnesio- and calciocarbonatite. Although hydrothermal alteration is strong and pervasive, several samples have well preserved magmatic features, such as radial aggregates of prismatic or tabular carbonates, and concentric zones with respect to Sr in carbonates. Calcite composition is restricted, with very low MgO, FeOt and SrO. The magmatic ferromagnesian carbonates display a wide Mg/Fe2+ range, from extremely magnesian to ankeritic, with relatively high SrO (up to 2,3%). Compositional zoning is shown by increasing FeOt, MnO and CaO, and decreasing MgO and SrO from core to rim, but reverse zoning may occur as well. These variations suggest two kinds of substitution: CaMg=FeMn and Ca=Sr. In terms of whole rock composition, the carbonatite complex has a trend toward higher Mg, Fe and Mn and lower Ca, probably due to calcite fractionation. These changes indicate low fO2 which favours the crystallization of carbonates progressivelly enriched in Fe, instead of magnetite. Oxygen-carbon stable isotope geothermometry supports a magmatic origin for these samples at temperatures from 700 to 400C. Low-Ba, well-preserved pyrochlore crystals present Th-Fe enrichment from core to rim, as a consequence of magmatic evolution. Mineral chemistry provides, therefore, a key to trace back phenomena of magmatic evolution, even in cases of carbonatites overprinted by post-magmatic alteration.

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